

REMARKS

Claims 2, 8, 9, 26, and 27 have been canceled. Claims 1, 3, 12, 14 through 16, 25, and 28 have been amended. Claims 1, 3 through 7, 10 through 25, and 28 through 30 remain in the application.

Claims 16 through 30 were objected to because of an informality in claim 16.

Claim 16 has been amended to change “said rocker arm” to “a rocker arm” to correct the informality. It is respectfully submitted that claims 16 through 30 are allowable over the objection.

Claims 15, 25, and 28 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any necessary supporting intervening claims.

Accordingly, claims 15, 25, and 28 have been amended and rewritten in independent form to include the limitations of the base claim and any necessary supporting intervening claims. It is respectfully submitted that claims 15, 25, and 28 are in a condition for allowance, which allowance is solicited.

Claims 1, 2, 8, 9, 11, and 13 were rejected under 35 U.S.C. § 102(e) as being anticipated by Djordjevic et al. (U.S. Patent No. 6,732,687). Applicants respectfully traverse this rejection.

U.S. Patent No. 6,732,687 to Djordjevic et al. discloses a lash adjuster with locking balls deactivation. An internal combustion engine 10 includes an exhaust valve 12 opened against a valve spring 14 by the force transmitted from a high lobe 16 on a cam shaft 18, through a pivotable finger arm 20 to a sliding surface at a top 22 of a valve stem 24, with a lash adjuster 26 configured in the normal, deactivated condition to provide a fixed pivot

point 28 at the other end of the finger arm 20. The lash adjuster 26 comprises a conventional main or primary piston assembly 38 and a secondary or control piston assembly 36 that are both situated within a guide body 44. In the illustrated embodiment, a unitary cylinder unit 42 functions as a tappet and defines both a primary cylinder 42A and a secondary cylinder 42B. The main or primary piston assembly 38 comprises a first piston 40 situated within the primary cylinder 42A and operates in the conventional manner. A primary hydraulic circuit provides hydraulic fluid from a primary inlet gallery 62 and an associated port through the guide body 44, to port 60 in the first cylinder 42A for the purpose of adjusting the axial position of the primary piston 40 relative to the first cylinder 42A. As is conventional, the first piston 40 has a passage 50 normally closed by a check valve 52 with associated ball spring and seat 54. The seat is urged against the base of the first piston 40 by another spring 54A supported by end wall 56. In the illustrated form, the first piston 40 has a hollow center 46 leading to a vent 48 in the head. Below the head, a narrower neck is captured within an aperture in sleeve 64, which is in turn fixed to the upper end of the first cylinder 42A.

Djordjevic et al. does not disclose a first piston and a housing have a first radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode and a second piston and the housing have a second radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active, the second radial clearance being greater than the first radial clearance.

In contradistinction, claim 1, as amended, clarifies the invention claimed as a valve actuator assembly for an engine including a movable engine valve, a movable finger for contact with the engine valve, and a rotatable cam for contact with the finger. The valve actuator assembly also includes a finger-support element assembly for contact with the finger comprising

a housing and a first piston and a second piston disposed in the housing. The first piston and the second piston are axially aligned and independently movable in the same direction to provide full lift of the engine valve in an activated mode and lost motion of the engine valve in a de-activated mode. The first piston and the housing have a first radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode. The second piston and the housing have a second radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active. The second radial clearance is greater than the first radial clearance.

A rejection grounded on anticipation under 35 U.S.C. § 102 is proper only where the subject matter claimed is identically disclosed or described in a reference. In other words, anticipation requires the presence of a single prior art reference which discloses each and every element of the claimed invention arranged as in the claim. *In re Arkley*, 455 F.2d 586, 172 U.S.P.Q. 524 (C.C.P.A. 1972); *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983); *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 U.S.P.Q. 481 (Fed. Cir. 1984).

Djordjevic et al. '687 does not disclose or anticipate the present invention of claim 1. Specifically, Djordjevic et al. '687 merely discloses a lash adjuster with locking balls deactivation having a primary piston assembly and a secondary piston assembly that are both situated within a guide body. Djordjevic et al. '687 lacks a first piston and a housing have a first radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode and a second piston and the housing have a second radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active, the second radial clearance being greater than the first

radial clearance. In Djordjevic et al. '687, the primary piston assembly 38 and the secondary piston assembly 36 have the same clearance within the guide body 44 and there is no second radial clearance between the housing and the second piston being greater than the first radial clearance between the housing and the first piston.

Djordjevic et al. '687 fails to disclose the combination of a valve actuator assembly for an engine including a movable engine valve, a movable finger for contact with the engine valve, a rotatable cam for contact with the finger, and a finger-support element assembly for contact with the finger comprising a housing and a first piston and a second piston disposed in the housing, the first piston and the second piston being axially aligned and independently movable in the same direction to provide full lift of the engine valve in an activated mode and lost motion of the engine valve in a de-activated mode, the first piston and the housing having a first radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode, the second piston and the housing having a second radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active, the second radial clearance being greater than the first radial clearance as claimed by Applicants. Therefore, it is respectfully submitted that claim 1 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 102(b).

Claims 3, 6, and 7 were rejected under 35 U.S.C. § 103 as being unpatentable over Djordjevic et al. '687 in view of Molitor et al. (U.S. Patent No. 5,485,813). Applicants respectfully traverse this rejection for the same reasons given above to claim 1.

Claims 4, 5, and 10 were rejected under 35 U.S.C. § 103 as being unpatentable over Djordjevic et al. '687 in view of Molitor et al. '813 and further in view of Geyer (U.S.

Patent No. 2,935,048). Applicants respectfully traverse this rejection for the same reasons given above to claim 1.

Claims 12 and 14 were rejected under 35 U.S.C. § 103 as being unpatentable over Djordjevic et al. '687 in view of Molitor et al. '813. Applicants respectfully traverse this rejection for the same reasons given above to claim 1.

Claims 16, 17, 20 through 24, 26, 27, 29, and 30 were rejected under 35 U.S.C. § 103 as being unpatentable over Djordjevic et al. '687 in view of Molitor et al. '813. Applicants respectfully traverse this rejection.

U.S. Patent No. 5,485,813 to Molitor et al. discloses a lost motion actuator with damping transition. An internal combustion engine has a component, such as a cylinder head 12, mounting a lost motion hydraulic actuator 14. The actuator 14 may be mounted in a bore 16 centered on an axis 18 in the cylinder head 12 of the engine. It is retained there by means of fasteners such as bolts, not shown, passing through clearance holes 20 in the actuator 14 and threaded into the cylinder head. Control of the hydraulic fluid is by means of a solenoid actuated valve 26 controlled by an electronic valve timing control unit or ECU 28. When the solenoid valve 26 is closed, the fluid is trapped in the actuator 14 forming a "solid fluid link" that functions to operate the actuator 14 by having a lower cam actuated piston 36 solidly connected by the fluid link to an upper valve actuating piston 38 so that both reciprocate together. The upper piston 38 is slidably located for reciprocating motion in a bypass sleeve 42 centered on the axis 18. In its lower position, the upper piston 38 rests on or near a shoulder or snap ring 44 as illustrated in FIG. 1. The bypass sleeve 42, in cross-section as indicated in FIG. 1, is shaped like an "H" with the upper piston 38 located in an upper (valve) chamber 46 above the cross bar of the "H" and the lower piston 36 located in a lower (cam) chamber 48 below the cross bar of the "H".

Both pistons 36, 38 are located along the central axis 18 of the bypass sleeve 42. In the upper chamber 46 there is located an upper spring 50 which biases the upper piston 38 away from the cross bar. The upper spring 50 is supported at one end by means of an orifice plate 52 resting on a support ring 54 formed in the cross bar and is located against the bottom of an annular recess in the upper piston 38. Located axially in the cross bar, is a chamber passage 56 allowing the flow of fluid between the upper 46 and lower 48 chambers. In the lower chamber 48 is a lower spring 58 biasing the lower piston 36 against the timing cam 30. The timing cam 30 is connected to an engine rotating shaft, typically the engine camshaft, and provides the basic valve opening and closing times for the various engine valves. Molitor et al. does not disclose a first piston and a housing sharing a common interface that has a sufficiently small radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode and a second piston and the housing sharing a common interface that has a sufficiently large radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active.

As to claim 16, claim 16, as amended, clarifies the invention claimed as a valve actuator assembly including a movable engine valve, a movable finger for contact with the engine valve, and a rotatable cam for contact with the finger. The valve actuator assembly also includes a finger-support element assembly for contact with the finger comprising a housing, a first piston disposed in the housing, a second piston being partially disposed in the housing and axially aligned with the first piston, a first spring disposed in the housing to urge the first piston away from the second piston, and a second spring disposed in the housing to urge the second piston into contact with a rocker arm. The first piston and the second piston are independently movable in the same direction to provide lift of the engine valve in an activated mode and lost motion of

the engine valve in a de-activated mode. The first piston and the housing share a common interface that has a sufficiently small radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode and the second piston and the housing share a common interface that has a sufficiently large radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active.

The United States Court of Appeals for the Federal Circuit (CAFC) has stated in determining the propriety of a rejection under 35 U.S.C. § 103, it is well settled that the obviousness of an invention cannot be established by combining the teachings of the prior art absent some teaching, suggestion or incentive supporting the combination. See In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 U.S.P.Q. 929 (Fed. Cir. 1984). The law followed by our court of review and the Board of Patent Appeals and Interferences is that “[a] prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art.” In re Rinehart, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (C.C.P.A. 1976). See also In re Lalu, 747 F.2d 703, 705, 223 U.S.P.Q. 1257, 1258 (Fed. Cir. 1984) (“In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.”)

None of the references cited, either alone or in combination with each other, teaches or suggests the claimed invention of claim 16. Specifically, Djordjevic et al. ‘687 merely discloses a lash adjuster with locking balls deactivation having a primary piston

assembly and a secondary piston assembly that are both situated within a guide body.

Djordjevic et al. '687 lacks a first piston and a housing sharing a common interface that has a sufficiently small radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode and a second piston and the housing sharing a common interface that has a sufficiently large radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active. In Djordevic et al. '687, the primary piston assembly 38 and the secondary piston assembly 36 have the same clearance within the guide body 44 and there is no large radial clearance between the housing and the second piston as compared to a small radial clearance between the housing and the first piston.

Molitor et al. '813 merely discloses a lost motion actuator with damping transition having a bypass sleeve shaped like an "H" with an upper piston located in an upper chamber above the cross bar and a lower piston located in a lower chamber below the cross bar. Molitor et al. '813 does not disclose a first piston and a housing sharing a common interface that has a sufficiently small radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode and a second piston and the housing sharing a common interface that has a sufficiently large radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active. In Molitor et al. '813, the pistons 36, 38 are located along the central axis 18 of the bypass sleeve 42 and have the same clearance within the bypass sleeve 42 and there is no large radial clearance between the housing and the second piston as compared to a small radial clearance between the housing and the first piston. As such, there is no motivation or suggestion for combining Djordevic et al. '687 and Molitor et al. '813 together.

The present invention sets forth a unique and non-obvious combination of a valve actuator assembly having valve-deactivation for an overhead-cam valve train. The references, if combinable, fail to teach or suggest the combination of a valve actuator assembly including a movable engine valve, a movable finger for contact with the engine valve, a rotatable cam for contact with the finger, a finger-support element assembly for contact with the finger comprising a housing, a first piston disposed in the housing, a second piston being partially disposed in the housing and axially aligned with the first piston, a first spring disposed in the housing to urge the first piston away from the second piston, and a second spring disposed in the housing to urge the second piston into contact with a rocker arm, the first piston and the second piston being independently movable in the same direction to provide lift of the engine valve in an activated mode and lost motion of the engine valve in a de-activated mode, the first piston and the housing sharing a common interface that has a sufficiently small radial clearance to control leak-down of high-pressure fluid supporting the first piston in an engine valve fully-active mode and the second piston and the housing sharing a common interface that has a sufficiently large radial clearance to enable high-speed reciprocating motion of the second piston when the engine valve is not fully active as claimed by Applicants.

Further, the CAFC has held that “[t]he mere fact that prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification”. In re Gordon, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). The Examiner has failed to show how the prior art suggested the desirability of modification to achieve Applicants’ invention. Thus, the Examiner has failed to establish a case of prima facie obviousness. Therefore, it is respectfully submitted that claims 16 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

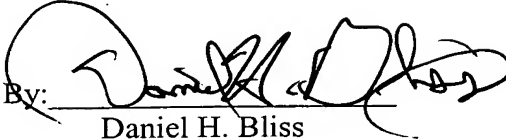
Claims 22 and 24 were rejected under 35 U.S.C. § 103 as being unpatentable over Djordjevic et al. '687 in view of Molitor et al. '813. Applicants respectfully traverse this rejection for the same reasons given above to claim 16.

Claims 18, 19, and 29 were rejected under 35 U.S.C. § 103 as being unpatentable over Djordjevic et al. '687 in view of Molitor et al. '813 and further in view of Geyer '048. Applicants respectfully traverse this rejection for the same reasons given above to claim 16.

Obviousness under § 103 is a legal conclusion based on factual evidence (In re Fine, 837 F.2d 1071, 1073, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988), and the subjective opinion of the Examiner as to what is or is not obvious, without evidence in support thereof, does not suffice. Since the Examiner has not provided a sufficient factual basis, which is supportive of his/her position (see In re Warner, 379 F.2d 1011, 1017, 154 U.S.P.Q. 173, 178 (C.C.P.A. 1967), cert. denied, 389 U.S. 1057 (1968)), the rejections of claims 3 through 7, 10, 12, and 14 through 25, and 28 through 30 are improper. Therefore, it is respectfully submitted that claims 3 through 7, 10, 12, and 14 through 25, and 28 through 30 are allowable over the rejections under 35 U.S.C. § 103.

Based on the above, it is respectfully submitted that the claims are in a condition for allowance, which allowance is solicited.

Respectfully submitted,

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